tory become a branch of the Carnegie Institution and should Dr. Gardiner be retained as secretary, he should receive a salary.

Dr. Gardiner sends his letter to the 'Editor of Science,' but addresses me personally. The editor of SCIENCE, as representing the policy of the journal, is responsible for the acceptance of my article for publication, but not for the opinions expressed in it.

J. MCKEEN CATTELL.

COLUMBIA UNIVERSITY.

ORANGE COUNTY MASTODONS.

MR. GORDON will, I trust, pardon me for saying that he is mistaken in supposing that the bones of the last three mastodons discovered in Orange County were found in their proper relative positions. The Schaeffer specimen was scattered over about thirty by fifty feet and the greater portion of three legs was never found. The Monroe specimen is sadly incomplete and there is reason to suppose that part of it is a hundred yards away from where the tusks were discovered. Finally, the entire hind legs of the otherwise fine animal at Yale have never been recovered. There is also a specimen at Vassar that I believe came from the vicinity of Newburgh, and this too is incomplete.

It is possible, however, that Mr. Gordon has reference to the Peale specimens, and these, I believe, were fairly complete. If it is to these that Mr. Gordon refers, the mistake is on my part. F. A. LUCAS.

WASHINGTON, D. C.,
October 10.

SHORTER ARTICLES.

THE BITTER ROT DISEASE OF APPLES.

ON July 10, of this year, Mr. R. A. Simpson, an agent in the employ of this laboratory, called our attention to the fact that the bitter rot spores which infected the apples in his orchard at Parkersburg, Ill., seemed to come from canker-like formations on the limbs of the apple trees. The bitter rot was first observed by him July 9. An examination of the trees on which the rot had appeared showed that in almost every instance it was possible to trace the infection to such a canker. The tracing was comparatively an easy matter, as the first lot of infected fruit usually occurs distributed in the form of a cone, with its apex towards the top of the tree. Although it seemed probable from Mr. Simpson's discovery, which was verified and extended by us several days later, both in the orchard at Parkersburg and elsewhere in Illinois and Missouri, that a causal relation existed between the cankers and the bitter rot disease of the apples, it was not thought sufficiently well proven at that time to warrant publication. Examinations of the cankers showed the presence of pycnidia containing the characteristic pale bitter rot spores, likewise of numerous spores of *Sphæropsis malorum*, of a species of *Alternaria* and spores of several other fungi. In the cultures made from numerous cankers *Glœosporium fructigenum* appeared in every instance.*

At first conidia borne free on short hyphal branches appeared in the pure cultures, and later on the pink masses of spores usually found on diseased fruits. When kept for some time, the fungus in these pure cultures produced perfect perithecia and asci. Mycelium which produces perithecia and asci when transferred to fresh apple agar, will continue forming perithecia, the latter appearing in such fresh cultures seven to eight days after the transfer. Inoculations were made into the bark of healthy apple trees about the middle of July, with spores from pure cultures obtained from the cankers. At the same time apples were inoculated with these same spores. In the course of a week the infected apples showed every sign of the bitter rot disease as found out of doors. Inoculations were likewise made with *Glœosporium* spores taken from apples recently attacked in the orchard, both into healthy apples and into growing apple branches, at the Missouri Botanical Garden. Inoculations into the branches were made by making shallow cuts through the bark, and inserting a needle point covered with spores into the cut. Control cuts were made for every inoculation, distant but two to three inches from the infected cut. At first little difference was noticeable between

* Most of the cultures were made by Mr. Geo. G. Hedgcock, assistant in pathology.